CLAIMS

What is claimed is:

1. A system for deskewing signals on parallel bus channels comprising:

a plurality of parallel channels, the plurality of channels carrying a plurality of data input signals and a pair complementary voltage and timing reference signals;

a plurality of receivers, each receiver being coupled to receive a data input signal and the pair of complementary voltage and timing reference signals, wherein each receiver differentially compares a received data input signal with a signal in the pair of complementary voltage and timing reference signals;

an alignment monitor circuit coupled to monitor the alignment of a data input signal relative to a signal in the pair of complementary voltage and timing reference signals; and

a plurality of programmable delay circuits, each programmable delay circuit being coupled to a channel and programmable with a delay value based on the alignment of a data input signal relative to a signal in the pair of complementary voltage and timing reference signals.

2. The system of claim 1 wherein the alignment monitor comprises:

a latch coupled to a logic circuit that performs an exclusive-OR operation between an output of a receiver and a delayed version of a signal in the pair of complementary voltage and timing reference signals; and

a logic circuit that detects the logic state of the latch.

3. The system of claim 1 wherein the alignment monitor comprises:

a latch coupled to a logic circuit that performs an exclusive-NOR operation between an output of a receiver and a delayed version of a signal in the pair of complementary voltage and timing reference signals; and

a logic circuit that detects the logic state of the latch.

4. A system for data communications comprising:

a transmitter group, the transmitter group being coupled to a plurality of channels;

a plurality of programmable delay circuits coupled individually to each of the plurality of channels, each programmable delay circuit for each specific channel being programmed with a delay value based on the relative alignment of a data input signal transmitted on the specific channel; and

a plurality of receivers, each receiver comprising:

a first differential amplifier for receiving a data input signal on a first channel and a first reference signal on a second channel;

a second differential amplifier for receiving the data input signal on the first channel and a second reference signal on a third channel, the second reference signal being a complement of the first reference signal, wherein the first reference signal and the second reference signal are common to the plurality of receivers; and

a steering logic coupled to switch the output of either the first differential amplifier or the second differential amplifier to an output node depending on whether the data input signal has changed state.

5. The system of claim 4 wherein each receiver further comprises:

a first latch coupled to a logic circuit that performs an exclusive-OR operation on the output of the receiver and a delayed version of the first reference signal;

a second latch coupled to a logic circuit that performs an exclusive-OR operation on the output of the receiver and a delayed version of the second reference signal; and

a logic circuit that detects the logic state of the first latch and the second latch.

6. The system of claim 4 wherein each receiver further comprises:

a first latch coupled to a logic circuit that performs an exclusive-NOR operation on the output of the receiver and a delayed version of the first reference signal;

a second latch coupled to a logic circuit that performs an exclusive-NOR operation on the output of the receiver and a delayed version of the second reference signal; and

a logic circuit that detects the logic state of the first latch and the second latch.

7. A system for data communications comprising:

a plurality of parallel channels, the plurality of channels carrying a plurality of data input signals, a first pair of complementary reference signals, and a second pair of complementary reference signals; and

a plurality of receivers, each receiver being coupled to receive a data input signal, the first pair of complementary reference signals, and the second pair of complementary reference signals, wherein each receiver outputs a logic state based on a differential comparison of the received data input signal with either the first pair of complementary reference signals or the second pair of complementary reference signals, and wherein the first pair of complementary reference signals and the second pair of complementary reference signals are common to the plurality of receivers.

8. The system of claim 7 further comprising a plurality of programmable delay circuits, each programmable delay circuit being coupled to a single channel and programmable with a delay value based on the alignment of a data input signal relative to the first and second pairs of complementary reference signals.

9. A method for deskewing signals on parallel channels comprising:

providing a plurality of channels, the plurality of channels carrying a plurality of data input signals and a pair of complementary reference signals;

providing a plurality of receivers, each receiver receiving a data input signal and the pair of complementary reference signals;

in a receiver, receiving a series of data input signals on a first channel;

monitoring the alignment of the received series of data input signals relative to the pair of complementary reference signals; and

adjusting the skew on the first channel based on the results of the alignment monitoring.

10. The method of claim 9 wherein the skew on the first channel is adjusted by programming a programmable delay circuit coupled to the first channel.

11. The method of claim 9 wherein the act of adjusting the skew on the first channel is performed during start-up of a device that includes the plurality of receivers.

12. The method of claim 9 wherein the act of adjusting the skew on the first channel is performed during idle periods of a device that includes the plurality of receivers.

13. A method for deskewing signals on parallel channels comprising:

providing a plurality of channels, the plurality of channels carrying a plurality of data input signals, a first pair of complementary reference signals, and a second pair of complementary reference signals;

providing a plurality of receivers, each receiver receiving a data input signal, the first pair of complementary reference signals, and the second pair of complementary reference signals;

for each receiver:

testing the alignment between data input signals received on a first channel, the first pair of complementary reference signals, and the second pair of complementary reference signal;

selecting a complementary reference signal best aligned with the data input signals received on the first channel; and

differentially comparing data input signals received on the first channel with the selected complementary reference signal.

14. The method of claim 13 wherein the act of testing the alignment is performed prior to normal operation of a device that includes the plurality of receivers.

15. The method of claim 13 wherein the act of selecting a complementary reference signal is performed automatically.

16. The method of claim 13 further comprising:

adjusting the skew on the first channel by programming a programmable delay circuit.